CONTRACT RESEARCH PROGRAM
PROBLEM STATEMENTS
1993

ENGINEERING RESEARCH AND DEVELOPMENT BUREAU
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
Mario M. Cuomo, Governor/John C. Egan, Commissioner

I. SUMMARY

NYSDOT
Library
50 Wolf Road, POD 34
Albany, New York 12232

1. A COMPREHENSIVE REVIEW OF CABLE GUIDERAIL PRACTICE

Cost: $200,000

Duration: 24 months

Products:

1. An assessment of impact of improperly tensioned cable guiderail on safety.
2. A maintenance plan for retensioning cable and a feasibility assessment of implementing such a program.
3. Guidelines for barrier need and selection based on all relevant costs, safety, and site characteristics.
4. A detailed work plan for a project to evaluate safety performance of cable guiderail systems with respect to the existing vehicle fleet on New York State highways.

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2. IMPROVED VISIBILITY FOR SNOW PLOW OPERATIONS

Cost: $85,000

Duration: 12 months

Products:

1. Improved lighting systems.
2. Air foils and plow blade attachments.
3. Improved windshield and mirror cleaning procedures.
4. Snow plow operator vision assessment and aids.

3. IMPROVING THE PRODUCTIVITY OF COMMERCIAL TRANSPORTATION IN METROPOLITAN AREAS

Cost: $150,000

Duration: 18 months

Products:

1. Develop a comprehensive list of alternative intermodal projects or highway in upstate urban areas.

2. Develop a planning tool, preferably computer-based, which can be used to determine the feasibility of these alternatives on a case-by-case basis.

3. Provide the ability for this tool to produce, for each alternative tested:

   - the potential reduction in truck highway miles;
   - transportation cost savings (costs) for both commercial and auto traffic; and
   - highway pavement cost savings.

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4. REVIEW (DEVELOPMENT) OF LIFE-CYCLE-COST AND NETWORK ANALYSES PROCEDURES

Cost: $160,000

Duration: 24 months

Products: Step-by-step life-cycle-cost and network analyses manual.

5. EFFECTIVE MARKETING OF TRANSIT SYSTEMS AND HIGH OCCUPANCY VEHICLES: CASE STUDY SYRACUSE, NEW YORK METROPOLITAN AREA

Cost: $120,000

Duration: 18 months

Products:

1. Report on existing public outreach programs and ongoing intermodal initiatives in Syracuse.
2. Recommendations of effective public outreach program(s) and policy actions/steps necessary to achieve a meaningful shift to intermodalism.
3. Identification of possible funding sources available, public and private, and administrative requirements to support intermodal initiatives.

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6. OPTIMIZATION OF AGGREGATE RESOURCES IN NEW YORK STATE

Cost: $160,000

Duration: 24 months

Products:

1. Estimate total available aggregate resources.
2. Feasibility of new mix design methods that require lesser quality and/or quantity aggregates.
3. Recycling guidelines for aggregate products.

7. TRANSPORTATION TAXES AND IMPACTS ON THE STATE ECONOMY

Cost: $80,000

Duration: 12 months

Products:

1. Description of state and local taxes and fees in New York State imposed on private companies providing transportation services.
2. Estimation of the percentage of total operating costs attributable to identified taxes and fees.
3. Comparison of tax structures in New York State to those in adjacent states and other competitive states.
4. Estimation of the impact on employment and industrial activity within New York State of a hypothetical increase or decrease in transportation taxes in New York State.
5. Comparison of the gain or loss in tax revenues to state and local government resulting from the hypothetical changes to the impact on employment and industrial activity.
6. Recommendation of appropriate changes in tax policy to maximize net benefits to New York State.

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8. PROTECTIVE COATINGS ON STEEL STRUCTURES

Cost: $120,000

Duration: 18 months

Product: A recommendation to the Department on the bridge painting problem.

9. LATERAL PROTECTION FOR SAFETY IN SHORT-TERM WORK ZONES

Cost: $80,000

Duration: 12 Months

Product: Portable physical system to protect workers from lateral intrusion of vehicles within a work zone.

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10. COST-EFFECTIVENESS OF CONSOLIDATING GOVERNMENT HIGHWAY SERVICES

Cost: $80,000

Duration: 12 months

Products:

1. Identification of local highway maintenance and operational functions that could be consolidated.
2. Outlining methods for achieving this consolidation.
3. Analysis of potential cost savings.
4. Identification of institutional & political barriers.
5. Developing an implementation plan that explicitly addresses how to deal with these obstacles.
6. Recommendations for legislative changes.

11. NIGHTTIME VISIBILITY OF HIGHWAY SIGNS

Cost: ~~$120,000~~ 40,000

Duration: 6 months

Products:

1. A synthesis of current knowledge on factors affecting nighttime visibility of highway signs and their relative importance.

2. An assessment of future research needs to ensure that the best combinations of relevant factors (such as brightness, contrast, letter size, etc.) are used in designing traffic signs.

3. A prioritized list of research projects on this topic including their scope, suggested research methods, and anticipated costs and benefits.

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12. EVALUATION OF CONSTRUCTION QUALITY-ASSURANCE TECHNIQUES

Cost: $120,000

Duration: 18 Months

Products:

1. Survey of construction operations currently requiring long person-hours to evaluate (such as pile length and degree of compaction.)

2. List cost-effective, reliable methods for measuring quality of construction for those operations.

3. Evaluation of methods used by other state DOT's and contracting firms.

4. Specifications in DOT format for the identified test methods.

13. EVALUATING THE IMPACT OF CAAA REQUIREMENTS

This proposed research overlaps with a national study submitted to NCHRP by the Environmental Analysis Bureau. The Project is titled: "Qualification of Air Quality Benefits and Costs Resulting From Measures to Reduce Automobile Travel." The $1.5 million study is supported by New York, California, and Pennsylvania States and by TRB Committee on Transportation & Air Quality. Although project approval is still pending, it was recommended as a high priority research problem in the Transportation Research Circular No. 389, "Environmental Research Needs in Transportation." The difference between the two studies lies in the scope of implementation.

We have discussed the matter with Mr. A. Kupferman of the Policy Development Group (the initial suggestor of the national project). He questions whether initiation of this proposed project would be useful. Hence, in light of the proposed national study and given the large amount of funding required for studies of this nature, we concluded that conducting this project would be a duplication of effort and misallocation of valuable resources.

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14. DEPARTMENT'S INTEGRATION OF ISTEA MANAGEMENT SYSTEMS

An Executive Steering Committee was recently established for development/management/coordination of the management systems and a preliminary Concept Plan has been developed. Since this problem is being addressed internally, we have not developed project scope, cost, and duration estimates for contract research consideration.

II. EVALUATIONS

1. A COMPREHENSIVE REVIEW OF CABLE GUIDERAIL PRACTICE

Cost: $200,000

Duration: 24 months

Products:

1. An impact assessment of improperly tensioned cable guiderail on safety.
2. A maintenance plan for retensioning cable and a feasibility assessment of implementing such a program.
3. Guidelines for barrier need and selection based on all relevant costs, safety, and site characteristics.
4. A detailed work plan for a project to evaluate safety performance of cable guiderail systems with respect to the existing vehicle fleet on New York State highways.

A COMPREHENSIVE REVIEW OF CABLE GUIDERAIL PRACTICE

PROBLEM: In the 1960's and 1970's New York State played a leading role in guiderail system development. Light-post/strong-beam systems (cable, W-beam, box beam) were designed, tested, and improved during that period. These systems, subsequently adopted as AASHTO standard options, are based on the principle of a rail in tension with some resistance provided by the supporting posts. Tension is the key to cable guiderail system performance. Hence, the cable system requires regular maintenance and retensioning to ensure safe operation.

In the interest of maximizing motorist safety in crashes, New York's design philosophy has been to use the most yielding rail that fits geometric conditions at the site. Cable guiderail is used where there is least danger in impact situations for vehicle occupants and requires the lowest cost to install. For these reasons, when there are no nearby obstacles and slopes are appropriate, cable guiderail has been the first choice. As a result of this policy more cable guiderail has been installed than any other barrier system. Furthermore, New York probably has the largest inventory of cable guiderail in the country.

When these systems were developed maintenance forces were much larger, but the maintenance staff has suffered significant reduction since then. This makes it harder than ever for them to get out and tighten up cable rails. Hence, there is no standard maintenance tensioning program in place. The impact of this "leave it alone" practice on the rail performance is not known.

The vehicle fleet today contains a larger percentage of smaller cars with low frontal profiles and light trucks (vans, mini-vans, pick-up trucks). It is speculated that cars with lower frontal profiles are more likely to ride under the cable railing and light trucks more prone to roll over upon impact with existing rail systems. Performance of cable and other guiderail systems with respect to vehicle characteristics needs to be assessed.

GOAL: The purpose of this study is to evaluate performance of cable guiderail systems, in today's environment, with respect to cost, safety, durability, and maintenance needs.

OBJECTIVES:

1) Assessment of impact of improperly tensioned cable guiderail on safety.

2) Development of a maintenance plan for retensioning cable and estimating the resources required for carrying out this plan.

3) Development of a framework for obtaining life-cycle costs for cable guiderail and comparable systems.

4) Development of new guidelines for barrier need and selection considering cost, safety, site characteristics, and the region's ability to maintain the recommended system.

5) Development of a detailed work plan for a study to evaluate safety performance of cable guiderail systems with respect to the existing vehicle fleet on New York State highways. The plan should address the vehicle characteristics that need to be included in the study, methods that will be used, and a benefit/cost assessment.

BENEFIT: The major benefit of this research will be increased safety to traveling public. This will be realized through improved selection and design criteria for guiderail systems, and through improved maintenance of existing systems.

CLIENTS: Facilities Design, Highway Maintenance, Traffic Engineering and Safety Divisions.

A COMPREHENSIVE REVIEW OF CABLE GUIDERAIL PRACTICE

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Most research pertaining to cable guiderail systems has been performed by NYSDOT. A number of earlier research reports prepared during 1960s and 1970s addressed theoretical design and testing for these systems. A series of research projects, undertaken between 1983 and 1987, addressed modifications to design of the guiderail systems to accommodate the changing vehicle fleet, and tried to assess safety impacts of vehicle characteristics on barrier performance through analysis of accident statistics. Research Report 155 (published in 1992) summarized the scope and conclusions of these studies. Observations most pertinent to the suggested research here are 1) minor deficiencies in the barrier can adversely affect performance and it is important to maintain traffic barriers to as near to the as-built condition as possible, 2) performance of barriers is somewhat reduced for light trucks, with more secondary impacts and penetration of the guiderails, and 3) the verdict on performance of barriers with respect to cars with lower frontal designs was inconclusive due to scarcity of accidents involving these cars during the period that accident data were obtained. Research Report 124 (1985) and Special Report 104 (1992), addressed tension loss in cable guiderail systems. The most significant conclusion was that cable guiderails continually lose tension and must be retensioned periodically. However, no recommendations were given on required retensioning frequency.

A TRIS database search revealed recent studies by Virginia, Kentucky, Pennsylvania, and Texas establishing or reviewing warrants and guidelines for selection of guiderail systems. A number of other studies addressed safety of roadside features for smaller cars, using engineering and statistical analyses and testing. NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features" (published in 1993), establishes guidelines for crash testing of safety hardware and provides information on enhanced measurement techniques and instrumentation. The literature search also included information on finite-element models developed to simulate interaction of vehicles with roadside devices. Studies specifically addressing maintenance issues for the cable guiderail systems could not be located.

B. Ongoing/Programmed Research

NCHRP Project 22-11, "Evaluation of Roadside Features to Accommodate Vans, Mini-Vans, Pick-up Trucks, and 4-Wheel Drive Vehicles," will evaluate safety performance of roadside features for light trucks. This project is still in its developmental stages. Although

a number of proposals have been received, none has addressed evaluation of cable guiderail systems.

Objectives of ongoing NCHRP Project 22-9, "Improved Procedures for Cost-effective Analysis for Roadside Safety Features," are to develop cost-effectiveness analysis models for alternative roadside treatments and to develop warrants and guidelines considering performance levels of safety features.

FHWA is pursuing computer simulation modeling of vehicle crashes using finite element code DYNA3D. Their current modelling efforts are in preliminary stages and need considerable development and validation before models can be used for various vehicle characteristics and roadside features.

C. Relevance

All of these ongoing research studies are pertinent to the suggested research. Their progress and modeling techniques should be monitored for possible application in this study. NCHRP Report 350 will also serve as a useful reference for development of testing plans. The scope of the suggested research, however, does not duplicate the efforts of any of these past or ongoing studies.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

1. Increased safety to the traveling public, realized through improved selection and design criteria for guiderail systems and through improved maintenance of existing systems.

2. Identification of research needs and methods having maximum benefits on safety of the current vehicle fleet.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

1. To determine the effect of tension loss on safety, analytical models, computer simulation, or limited number of crash tests (to validate the models used) may be considered.

2. To develop a maintenance plan and to assess its feasibility, the following tasks are anticipated:

    a. Develop a statewide inventory of cable guiderail systems.

b. Determine the most suitable methods and instruments to measure in-service tension of cable guiderails.

c. Develop and execute a sampling program to determine tension loss and related parameters (e.g, time since last retensioning, season, etc.), or conduct laboratory testing to determine tension loss under accelerated field conditions and validate results using small-scale field sampling.

d. Determine required timing and frequency for maintenance.

e. Estimate the cost and feasibility of implementing the recommended maintenance program.

3. To develop a work plan to evaluate safety performance of cable guiderail systems, the following steps are recommended:

   a. To assess the benefits of the study, the following steps may be useful:

      1) Analyze statistics on accidents involving impact with barriers from recent years in terms of severity, type of vehicle, type of barrier, etc.

      2) Determine and document extent of use of cable guiderail in other states and their experiences with it.

   b. Establish trends in vehicle fleet changes and composition of the vehicle fleet, in terms of subclasses with different geometric characteristics.

   c. Determine the models to be used in the study. Give details of any analytic or computer models to be used. Describe the methods that will be used to validate these models. If crash testing is recommended, provide a detailed experimental plan including the models of vehicles to be used and the tests to be performed.

   d. Estimate time and resource requirements for the study.

B. Resource Requirements

FY 94-95	FY 95-96	TOTAL
$100,000	$100,000	$200,000

C. Estimated Duration

24 months

D. Implementation

The Highway Maintenance, Facilities Design, and Traffic Engineering and Safety Divisions will assist in this research and will be responsible for evaluation, adoption, and implementation of its recommendations.

2. IMPROVED VISIBILITY FOR SNOW PLOW OPERATIONS

Cost: $85,000

Duration: 12 months

Products:

1. Improved lighting systems;
2. Air foils and plow blade attachments;
3. Improved windshield and mirror cleaning procedures; and
4. Snow plow operator vision assessment and aids.

IMPROVED VISIBILITY FOR SNOW PLOW OPERATIONS

PROBLEM: In the winter of 1992-1993, over 9,000,000 miles (14,500,000 km) were driven by highway maintenance workers performing snow and ice removal operations. Sometimes, these drivers work over fifteen hours a day to keep New York highways clear of snow and ice. A New York winter season can include several long "lake effect" snowfall and a few blizzards. The snow plow drivers experience fatigue and eyestrain due to the poor visibility conditions. The visibility of the snow plow driver is further decreased by a combination of blowing snow caught in the truck's aerodynamic turbulence and glaring lights from the truck, oncoming traffic, and overhead lighting. This poor visibility also impairs the safety of the operation. Research is needed to improve visibility to the maximum practical extent for the improved comfort, efficiency, and safety of our highway maintenance workers, pedestrians, and the travelling public.

OBJECTIVE: To develop products and methods that increases visibility, diminishes stress and fatigue, and improves general safety. Some possible products may include:

1) Improved lights and luminaries
2) Better lighting configurations
3) Air foils and plow blade attachments
4) Better windshield cleaning strategies
5) New windshield materials
6) Mirror heating and placement
7) Operator vision assessment and corrective lenses
8) Specialized glare-reducing eyeglasses

BENEFITS: Improved efficiency, effectiveness, and safety of snow removal operations in New York State.

CLIENT: Highway Maintenance Division

IMPROVED VISIBILITY FOR SNOW PLOW OPERATIONS

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Minnesota DOT performed research in 1989 on the positioning of strobe lights on its snow plows to improve their visibility. Also, research on the snow cloud produced by large trucks was performed by CERI in Japan and its results were published in Transportation Research Record No. 1387. However, this research did not specifically examine snow plows. SHRP product 3026 is a polyethylene scoop that attaches to the plow blade and can reduce the snow cloud produced. These efforts concentrate on making the snow plow more visible to drivers of nearby vehicles.

B. Ongoing/Programmed Research

A "Request for Proposals" was issued by NCHRP Project 6-12 "Improved Visibility for Snow Plowing Operations" last year. No proposals were judged suitable. This project emphasizes visibility, but not vision assessment and aids.

C. Relevance

This research will consider previous work and develop products and methods to address the special conditions of New York State. In particular, developments of NCHRP Project 6-12 should be considered when they become available. If a renewed search for an acceptable contractor proves successful, this project may not be necessary.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

This research will increase visibility for snow plow drivers, and improve their productivity and effectiveness. It will also improve safety by reducing the number of accidents with other vehicles and with other highway features.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

1. Do a literature search for pertinent research results and a solicitation of ideas from highway maintenance and other DOT workers.

2. Evaluate these for merit and feasibility. Identify candidates for testing.

3. Submit an interim report to NYSDOT dettailing the testing plan to be performed in the next winter season. Practical research will be stressed over theoretical.

4. Perform testing for a variety of locations and conditions in the state.

5. Do an assessment of technical, operational, and economic impacts of the results, with emphasis on effectiveness, reliability, and costs.

6. Submit a final report summarizing the above tasks, along with any recommendations, and instructions for implementation.

B. Resource Requirements

FY 94-95: $85,000

C. Estimated Duration

12 months

D. Implementation

The client is the Highway Maintenance Division and they will assist in the research and implementation of the results.

3. IMPROVING THE PRODUCTIVITY OF COMMERCIAL TRANSPORTATION IN METROPOLITAN AREAS

Cost: $150,000

Duration: 18 months

Products:

1. Develop a comprehensive list of alternative intermodal projects or highway in upstate urban areas.

2. Develop a planning tool, preferably computer-based, which can be used to determine the feasibility of these alternatives on a case-by-case basis.

3. Provide the ability for this tool to produce, for each alternative tested:

   - the potential reduction in truck highway miles;
   - transportation cost savings (costs) for both commercial and auto traffic; and
   - highway pavement cost savings.

3. IMPROVING THE PRODUCTIVITY OF COMMERCIAL TRANSPORTATION IN METROPOLITAN AREAS

I. RESEARCH PROBLEM STATEMENT

There has been significant growth in movement of goods via highway over the last several decades. As a result, both truck size and miles travelled over state and Federal aid highways have substantially increased over time. Recent changes in federal regulations have also allowed larger trucks to travel longer distances off established highway networks, and in many instances to access urban areas directly, contributed to increased traffic congestion and decreased air quality in urban areas.

There is a need to investigate various alternatives to improve the productivity of transporting goods to and from urban areas utilizing intermodal strategies and other means of reducing congestion.

II. PROPOSED RESEARCH

The study should examine various intermodal alternatives and evaluate means to improve access to and from these terminals. Specific highway-related improvements that would enhance truck traffic flow should also be examined. Alternatives could include designated truck routes, signs, signal light timing, access routes to nearby interstate interchange and geometric improvements.

A mechanism should also be developed to analyze the costs and benefits of alternatives and prioritize their feasibility for individual urban areas.

The study should determine the potential reduction in truck highway miles as a result of these strategies.

It is preferable that the evaluation tool developed by computer based and structured to allow easy development of different urban networks and transportation databases. A comprehensive test case for an Upstate New York urban area should be included in the analysis.

III. STUDY PRODUCTS

1. Develop a comprehensive list of alternative intermodal projects or highway improvements which could be considered in efforts to enhance the flow of goods in upstate urban areas.

2. Develop a planning tool, preferably computer-based, which can be used to determine the feasibility of these alternatives on a case-by-case basis.

3. Provide the ability for this tool to produce, for each alternative tested:

   - the potential reduction in truck highway miles,
   - transportation cost savings (costs) for both commercial and auto traffic, and
   - highway pavement cost savings.

IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

The estimated cost of this research is $150,000 over an 18-month period.

V. URGENCY AND PAYOFF POTENTIAL

This research could provide states with a valuable planning tool in reducing congested traffic areas in and around urban areas. This tool would supplement the development of states' intermodal and congestion management programs as required in ISTEA.

4. REVIEW (DEVELOPMENT) OF LIFE–CYCLE–COST AND NETWORK ANALYSES PROCEDURES

Cost: $160,000

Duration: 24 months

Products: Step–by–step life–cycle–cost and network analyses manual.

REVIEW (DEVELOPMENT) OF LIFE-CYCLE-COST AND NETWORK ANALYSIS PROCEDURES

GOAL: Development of life-cycle-cost analysis procedures, and system impact (network analysis) of new design procedures on the Department's capital program.

PROBLEM: New York State has been using life-cycle-cost analysis to compare treatments for rehabilitation projects[1]. Recently, in developing the new Thickness Design Manual for New and Reconstructed Pavements, life-cycle-cost analyses[2] were performed. The results showed that the new pavement design is more cost-effective than the previous pavement design. Next, the impact of the new thickness design procedure on the total capital program[3] was analyzed. This network analysis concluded that the impact is minimal.

In addition, Engineering Research is now studying a new overlay design procedure for New York State. It is anticipated that a new procedure will be implemented in the near future. Thus the impact of this new overlay procedure on the appropriate portion of the capital program will need to be evaluated. The evaluation will probably include a life-cycle-cost analysis and a network analysis.

Although the current life-cycle-cost and network analyses seem to be functioning properly, they should be reviewed to assure that they are appropriate.

OBJECTIVE:

1. Review life-cycle-costs analysis procedures used by the New York State Department of Transportation

   If review of methodology reveals a need for improvement, then examine existing procedures of other highway agencies to determine if portions can be adopted for use in New York.

2. Review network analysis procedures used by the Department

   If review of network analysis methodology reveals a need for improvement, then examine existing procedures from other agencies to determine if portions can be adopted for use in New York.

3. Develop improved procedures for life-cycle-cost and network analyses

BENEFITS: Study results will help in assessing cost-effectiveness of new designs and procedures, and optimize distribution of funds in the capital program to provide the highest possible quality highway system.

CLIENTS: Systems and Program Planning Bureau
Materials Bureau

REVIEW (DEVELOPMENT) OF LIFE-CYCLE-COST AND NETWORK ANALYSIS PROCEDURES

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Life-cycle-costs and network analysis have been studied in various states. A Transportation Research Information Service (TRIS) literature search revealed 99 articles concerning life-cycle-costs, many also addressing network analysis.

B. Ongoing/Programmed Research

Several TRIS items deal with the stated problem. Documents cited should be evaluated to determine if they are pertinent or significant.

C. Relevance

An accurate model of program costs and impacts of design change may allow New York State to optimize use of available funds.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

The end-product will be a manual providing the Department with a step-by-step procedure to analyze life-cycle-cost and network impact of any project on the appropriate portion of the capital program.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

Existing life-cycle-cost and network analysis procedures should be reviewed and recommendations made concerning their validity and/or adequacy. If improvement is found necessary, it should focus on existing procedures where data now collected by DOT could be used. Any method developed must not require data that is not currently collected by DOT. A thorough literature search and survey should identify all procedures currently in use elsewhere. Detailed evaluation of each method may determine the most suitable

procedure. Based on the review, a manual should be prepared providing a step-by-step procedure and data requirements to perform life-cycle-cost and network analyses.

B. Resource Requirements

	FY 93-94	FY 94-95	TOTAL	
Person-Years	1.0	1.0	2.0	
Cost		$80,000	$80,000	$160,000

C. Estimated Duration:

24 months

D. Implementation

The Systems and Program Planning Bureau and Materials Bureau will be responsible for implementing any new procedures that are adopted.

5. EFFECTIVE MARKETING OF TRANSIT SYSTEMS AND HIGH OCCUPANCY VEHICLES: CASE STUDY SYRACUSE, NEW YORK METROPOLITAN AREA

Cost: $120,000

Duration: 18 months

Products:

1. Report on existing public outreach programs and ongoing intermodal initiatives in Syracuse.

2. Recommendations of effective public outreach program(s) and policy actions/steps necessary to achieve a meaningful shift to intermodalism.

3. Identification of possible funding sources available, public and private, and administrative requirements to support intermodal initiatives.

EFFECTIVE MARKETING OF TRANSIT SYSTEMS AND HIGH OCCUPANCY VEHICLES, CASE STUDY: SYRACUSE, NEW YORK METROPOLITAN AREA

PROBLEM:

Enormous investments are being dedicated to create a statewide intermodal system and to encourage high-occupancy vehicles. A crucial element in the equation, namely the consumer attitude, has been underestimated and repeatedly overlooked. The public's long love affair with its automobiles has been, and still is, the fundamental obstacle in achieving an effective shift to intermodalism.

Research is needed to identify cost-effective strategies and means to accomplish this shift.

RESEARCH PROPOSED:

The project proposed, which will use syracuse as a case study, will attempt to answer the following questions:

* Can a public outreach program be effective in changing public preference and attitude toward transit systems and other TSM/TDM proposals?

* What type or types of public outreach programs are effective?

* What changes in these systems are needed to achieve a successful shift?

* What degree of shift is needed?

* What funding sources can be used?

* Which organization(s) should be responsible for implementing those changes?

TASKS/PRODUCTS TO ANSWER THE ABOVE QUESTIONS INCLUDE:

* Survey of existing public outreach programs and evaluation and analysis of the effectiveness of various types of programs, including what factors made the programs effective. Report on result of survey and evaluation and recommendation of what would be successful in the Syracuse area.

* Survey of places experiencing the modal shift focused upon in this problem and analysis of the changes that occurred and resources needed to help achieve a successful shift. Report on finding of the survey and analysis, including what is needed to make a shift in the Syracuse area.

* Research possible funding sources available, both public and private,and possible funding and administrative mechanisms. Report on funding sources available with administrative requirements.

* Survey of organizations that are trying to encourage this modal shift. Report on what is being used, what organizational structures are most successful, and recommendations of what structure to use in the Syracuse area.

ESTIMATE OF PROBLEM FUNDING RESEARCH PERIOD:

The estimated funding for this project is $120,000 for the task noted above. The research will require about 18 months to complete.

URGENCY AND PAYOFF POTENTIAL:

The project should give transit operators and transportation departments the tools and knowledge from which to carry out the intent of ISTEA regarding intermodality and mobility. Also, the requirements of management systems and other provisions of ISTEA make this a study which needs to begin now if states and transit operators are to fulfill Clean Air Act and ISTEA requirements.

6. OPTIMIZATION OF AGGREGATE RESOURCES IN NEW YORK STATE

Cost: $160,000

Duration: 24 months

Products:

1. Estimate total available aggregate resources.
2. Feasibility of new mix design methods that require lesser quality and/or quantity aggregates.
3. Recycling guidelines for aggregate products.

OPTIMIZATION OF AGGREGATE RESOURCES IN NEW YORK STATE

PROBLEM: Aggregate resources in many areas of New York State are diminishing rapidly, with three primary causes: 1) existing reserves are being depleted by mining, 2) environmental groups are advancing adverse zoning policies that reduce possible resources, and 3) developers are building in resource areas. The demand for high-quality aggregates in construction, however, continues and is even increasing.

Aggregate producers are distributed throughout the state, but are concentrated mostly in urban locations. Many areas are now importing aggregates from sources well outside their immediate boundaries. New York City and Long Island have no indigenous source of aggregate available and must rely on sources as far away as Canada.

Many communities exert control over mining through zoning ordinances. New York's policy of "home rule" does not allow the state to supersede the town land-use laws. Thus, in many instances the state issues a permit, but the community refuses to enact the zoning change that would permit mining, further reducing future output.

OBJECTIVE: Develop a strategy to optimize aggregate resources and meet future demand by the following actions:

1. Examine availability and assess economics of current and future aggregate resources in New York State,

2. Investigating the recycling potential of existing aggregate products, and

3. Investigating the feasibility of developing new mix-design procedures that can use aggregate of lesser quantity and/or quality but still produce a high-quality end-product.

BENEFIT: The proposed strategy can:

1. Examine adequacy of aggregate sources,

2. Reduce demand for aggregate by recycling and developing new mix-design procedures, and

3. Reduce construction waste and landfill burdens.

CLIENT: Materials Bureau
Soil Mechanics Bureau

OPTIMIZATION OF AGGREGATE RESOURCES IN NEW YORK STATE

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

A Transportation Research Information Service literature search revealed that a few articles are available concerning the impact of aggregate-source development in New York State. Many others deal with the issues of recycling, mix-design changes to use lesser-quality aggregate or reduce aggregate use, and use of waste resources (such as construction materials, tire rubber, glass, and other alternative products). Also, literature may be available through the U. S. Geologic Survey, which is responsible for monitoring New York State aggregate resources.

B. Ongoing/Programmed Research

Most of the TRIS articles just mentioned deal with studies of mix design and recycling of aggregates, and are in varying stages of completion.

C. Relevance

These studies may be directly relevant in developing strategies for recycling and new mix designs. Literature on the relationship between environmental regulations and economics is needed for this study.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

The highway construction community recognizes the need to develop cost-effective alternatives in using dwindling aggregate sources and addressing future demand for aggregate products. From environmental standpoints, more landfill space might be saved if construction waste could be recycled. Local zoning boards are opposing new aggregate source development, curtailing output, and even closing existing mines because of noise, dust, and truck traffic. Thus, the potential benefit of using less quantity and/or quality aggregates through new mix designs and recycling is quite substantial.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

1. Availability of current and future aggregate resources should be surveyed.

2. An economic analysis of future aggregate supply and demand should be performed.

3. Quantities and qualities of potential recycling to use alternative aggregates should be studied.

4. Feasibility of new mix-design methods to reduce virgin aggregate quantity and/or quality without reducing product performance should be studied.

5. Interaction of environmental groups, local residents, local government, the aggregate industry, and state agencies should be analyzed.

B. Resource Requirements

	FY 93-94	FY 94-95	Total	
Person-Years	1.0	1.0	2.0	
Personal Service	$80,000		$80,000	$160,000

C. Estimated Duration

24 months

D. Implementation

The Materials Bureau, and to a lesser extent the Soil Mechanics Bureau, will be responsible for identifying and adopting new aggregate sources and alternative aggregates that may emerge from this study.

7. TRANSPORTATION TAXES AND IMPACTS ON THE STATE ECONOMY

Cost: $80,000

Duration: 12 months

Products:

1. Description of state and local taxes and fees in New York State imposed on private companies providing transportation services.

2. Estimation of the percentage of total operating costs attributable to identified taxes and fees.

3. Comparison of tax structures in New York State to those in adjacent states and other competitive states.

4. Estimation of the impact on employment and industrial activity within New York State of a hypothetical increase or decrease in transportation taxes in New York State.

5. Comparison of the gain or loss in tax revenues to state and local government resulting from the hypothetical changes to the impact on employment and industrial activity.

6. Recommendation of appropriate changes in tax policy to maximize net benefits to New York State.

TRANSPORTATION TAXES AND IMPACT ON THE STATE ECONOMY

I. PROBLEM STATEMENT:

In addition to the general business taxes levied on all private business conducted within New York State, the State and local jurisdictions impose a number of taxes which apply only to commercial transportation services. It has been alleged that the tax structure in New York is inappropriately high when compared to neighboring states or national averages. While these taxes comprise only a small percentage of the operating costs of the private firms providing commercial transportation services in the State, it has been suggested that the State and local taxes on private commercial transportation companies are having a negative effect upon the State's economy and has a major impact upon decisions by industry to expend or locate within the State.

In addition to the registration fees for commercial highway vehicles and the excise taxes on motor fuel levied by all states, New York State (and only seven other states) imposes a weight-distance tax on all large trucks operating in the State. The State and local jurisdictions also share in a sales tax on motor fuels which can range up to 8¼ percent. The Petroleum Business Tax paid by the fuel suppliers (a tax unique to New York) is also passed through to the trucking industry and additional fees are paid for excessive non-divisible and divisible loads and for oversize vehicles.

It is alleged that local property taxes paid by freight railroads in New York State are among the highest in the nation. The Petroleum Business Tax on fuel used by the rail roads is also passed through to the railroad companies operating in New York.

To complete the picture, local Passenger Facility Charges imposed on flights originating or transferring at most New York State airports increase the cost of air passenger travel.

II. RESEARCH PROPOSED:

1. Description of State and local taxes and fees in New York State imposed on private companies providing transportation services.

2. Estimation of the percentage of total operating costs attributable to identified taxes and fees.

3. Comparison of tax structures in New York State to those in adjacent states and other competitive states.

4. Estimation of the impact on employment and industrial activity within New York State of a hypothetical increase or decrease in transportation taxes in New York State.

5. Comparison of the gain or loss in tax revenues to State and local government resulting from the hypothetical changes to the impact on employment and industrial activity.

6. Recommendation of appropriate changes in tax policy to maximize net benefits to New York State.

III. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD:

Using appropriate econometric models previously developed for New York State which are sensitive to transportation costs, the proposed research should be completed within 12 months at a cost of $80,000.

IV. URGENCY AND PAYOFF POTENTIAL:

Transportation tax revenues provide a significant portion of the funds needed by State and local government to operate and improve transportation facilities. More tax revenues will be needed in the future. Various lobby groups have urged the State to reduce present taxes. A policy on state transportation taxes which takes into account the impact on the State's economy is urgently needed to strike an appropriate balance between the transportation revenues needed to finance public services and the economic activity in the State.

8. PROTECTIVE COATINGS ON STEEL STRUCTURES

Cost: $120,000

Duration: 18 months

Products: A recommendation to the Department on the bridge painting problem.

PROTECTIVE COATINGS ON STEEL STRUCTURES

PROBLEM: Most state transportation agencies use protective coatings to extend the life and reduce maintenance costs of structures incorporating steel, such as bridges, making this an urgent problem of widespread interest. The most widely used coatings have been lead based paints. As the structures age, coatings deteriorate and must be replaced. Repainting these structures requires removal of the lead based paint system by abrasive blasting or other methods. New and more stringent air quality standards effectively prohibit open air blasting. Containment of blasting operations is economically restrictive.

Research is proposed to analyze alternative techniques such as mechanical removal, chemical removal, vacuum methods, and other more exotic methods (Infrared, carbon dixoide, glass vitrification, etc.) to remove coating systems. Research should be conducted on new protective coatings for steel structures to control and minimize corrosion, incorporating life-cycle costs and environmental concerns. Research should be directed to finding a protective coating that can be applied to an existing system with minimal surface preparation.

OBJECTIVE: Develop greater understanding of alternative coating systems available, or in development, and to reduce the cost of removing and disposing of paint-removal waste containing lead. This will be documented in a recommendation to the Department of a comprehensive strategy to deal with this issue.

BENEFITS: The recommendation to the Department on how to best handle the bridge painting program will result in more cost-effective use of resources. The major potential benefit of this proposed research is elimination of environmental and health risks associated with lead and other hazardous wastes. Reduced disposal cost for bridge-paint-removal waste is another potential benefit. One impact of implementation of the results would be reduction of hazardous-waste landfill burdens.

CLIENT: Highway Maintenance Division
Materials Bureau
Structures Division
Environmental Analysis Bureau

PROTECTIVE COATINGS ON STEEL STRUCTURES

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Any new research must recognize past and ongoing efforts, or resources will be spent in duplicating work without much likelihood of success. A Transportation Research Information Service literature search revealed 26 articles on this topic, indicating that it is an area that has not been ignored by research, but has been difficult to solve. This information should be summarized in order to recommend specific new research. There is also a body of research data and product information reported by manufacturers that must be evaluated.

B. Ongoing/Programmed Research

There is an ongoing FHWA contract study that concerns lead-based-paint removal from steel bridges and debris containment. Stabilization of paint-removal debris, efficiency of containment, health hazards to workers, and other environmental aspects are also parts of this investigation. The Steel Structures Painting Council also has an ongoing study of removal, collection, and disposal of lead-based paints. Other states (South Carolina, New Jersey) are evaluating spent blast abrasives as fines in asphalt.

C. Relevance

This ongoing work is directly applicable to New York's needs and is producing pertinent reference material.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

Reduced disposal costs for paint-removal waste is the major potential benefit. Cost and environmental analyses are complex and involve many often-conflicting aspects. The possibility or amount of dollar savings cannot be estimated at this time.

The impact of implementing this research, if deemed cost-effective, would be easement of landfill burdens. A possible negative impact might be raising other environmental issues that are not now recognized (i.e., alternative coating and/or removal systems).

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

The intent is to look at the broad issue of maintenance painting of bridges and develop strategies for dealing with it and documenting these strategies in a recommendation to the Department. Several respects of the issue need to be resolved. Life cycle costs should be analyzed for removal of old coatings, as well as new coating systems.

For removal of old lead based paints, given existing conditions and different possible future scenarios, should the Department attempt complete or partial removal? Once that issue is resolved, current and promising future methods should be evaluated and a recommendation made. The best method available now should be chosen on the basis of removal and disposal costs and liabilities.

Choice of new coating systems depends on whether full or partial removal is recommended. If the strategy is partial removal, compatibility with existing coatings, surface preparation requirements, and durability are significant issues that need to be addressed. If complete removal is recommended, metalizing and other similar coating systems need to be evaluated. Replacement of small steel bridges with timber bridges or large culverts is also an option to be explored.

Regulatory issues and subsequent costs should be analyzed as part of the evaluation of various techniques. Environmental impacts and air quality and worker health concerns are essential components of the analyses of both removal of coatings and new painting techniques.

B. Resource Requirements

FY 93-94	FY 94-95	Total	
Person Years:	1.0	0.5	1.5
Salary Costs:	$80,000	$40,000	~~$125,000~~ 120,000

C. Estimated Duration

18 months

D. Implementation

The Materials Bureau approves materials and writes specifications, and must be consulted in the event that new methods or materials are identified and/or adapted from other sources. Implementation of this research may require changes in current design procedures. Environmental regulations are the concern of the Environmental Analysis Bureau, and their

input on these issues is critical. Changing environmental regulations may lead to difficulties in implementing results -- a critical issue.

9. LATERAL PROTECTION FOR SAFETY IN SHORT-TERM WORK ZONES

Cost: $80,000

Duration: 12 Months

Product: Portable physical system to protect workers from lateral intrusion of vehicles within a work zone.

LATERAL PROTECTION FOR SAFETY IN SHORT-TERM WORK ZONES

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

A Transportation Research Information Service (TRIS) literature search found several articles on work zone safety. Many innovative approaches were discussed and identified. Examples of these safety devices are concrete and water-filled barriers, sonic warning devices, rumble strips, delineation devices, lighting devices, improved signs, robots, and a combination of these devices. However, no pertinent studies were found regarding physical protection from lateral intrusion of errant vehicles.

B. Ongoing/Programmed Research

The TRIS literature search did not find any ongoing research on this subject. However, the Strategic Highway Research Program (SHRP) presently has two studies (Products 3004-4004 and 3005) involving testing and developing two highly automated robotic vehicles. SHRP Product 3004-4004 is expected to identify, fill, and seal pavement cracks using two operators in this specialized vehicle. SHRP Product 3005 is expected to trim potholes, vacuum loose material, dry and heat surface, and fill potholes in a one-person operation. Both robotic vehicles, designed to minimize worker exposure in traffic, are expected to become available in 1995. However, the estimated cost of such vehicles may limit their use. In addition, SHRP has developed other work zone safety devices such as improved signing, lighting and sonic warning devices, but none physically protect the worker from lateral intrusion.

C. Relevance

The SHRP products are addressing some of the safety issues facing the Department. However, no research has been done for physical protection from lateral intrusion in short-term work zones.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

Most of the traffic protection devices currently available focus on alerting drivers attention, but do not prevent errant vehicles from entering the work zone laterally. The effective protection to be developed in this research will improve short-term work zone safety significantly.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

The development of lateral physical-protection device(s) for short-term operations is the research goal. This may be achieved by the following tasks:

1) Identify characteristics of maintenance operations of the Department and requirements for their safety protection. Determine if different safety devices are needed for these operations. Identify characteristics of operation and requirements for safety protection.

2) Develop lateral physical-protection design(s) for the requirements identified above. The design(s) should prevent lateral vehicle intrusion, be portable, quick to assemble and install, and be cost effective. One solution that could be considered is a portable cable guide-rail system supported between two heavy trucks.

3) Identify and assess risks and liabilities associated with the new design(s).

4) Estimate costs for a prototype of the developed design(s).

5) Summarize the above in a final report.

B. Resource Requirements

FY 94-95

Personal Services $80,000

TOTALS $80,000

C. Estimated Duration

12 months

D. Implementation

The Office of Human Resources, Highway Maintenance Division, and the Traffic and Safety Division will implement the research results.

10. COST-EFFECTIVENESS OF CONSOLIDATING GOVERNMENT HIGHWAY SERVICES

Cost: $80,000

Duration: 12 months

Products:

1. Identification of local highway maintenance and operational functions that could be consolidated.
2. Outlining methods for achieving this consolidation.
3. Analysis of potential cost savings.
4. Identification of institutional & political barriers.
5. Developing an implementation plan that explicitly addresses how to deal with these obstacles.
6. Recommendations for legislative changes.

NIGHTTIME VISIBILITY OF HIGHWAY SIGNS

PROBLEM: Responding to increasing emphasis on needs of aging drivers in terms of vision and reaction time, brighter reflective sheeting for highway signs is being considered on the premise that " brighter is better". However, recent studies have shown that although older drivers need more illumination to see an object clearly, they also possibly suffer more from excessive glare associated with brighter sheeting.

Two measures of visibility for highway signs are detection distance and legibility distance. Detection occurs when a motorist sees the sign without being able to read it. Aside from driver's visual capabilities, sign detection is a function of its size, shape, brightness, placement, and complexity of the highway scene. Legibility occurs when a motorist can distinguish the letters, symbols, and words, thus reading the sign. Variables affecting legibility include color, size, and brightness; letter height, width, and spacing; and amount of contrast between background and legend.

Drivers require a minimum level of brightness both for detectability and legibility. Beyond this, one way of increasing detectability is using brighter materials. Limitations to this approach are the higher material cost and possible reduction in legibility due to overglow. A more effective approach may be using a combination of relevant factors such as brightness, contrast, size, and lettering to improve overall visibility of the sign. Questions that need to be answered are: To what extent and under what conditions does brighter reflective sheeting aid the driver? What combination of brightness, contrast, and other relevant factors best serve the motorist? What are the most effective design and material selection criteria for highway signs in terms of visibility, cost, service life, and replacement cycles?

OBJECTIVES:

1. To synthesize available and ongoing research on nighttime visibility of highway signs. Synthesis should focus on the relative importance of various factors for visibility, should summarize all results that have been obtained on this topic (through laboratory and field experiments), and identify significant gaps in the state of knowledge. It should also identify any potential applications of these findings to the material selection and design for highway signs in New York State.

2. To recommend and rank future research needs in determining relative importance of factors affecting the nighttime visibility of highway signs, and establishing trade-offs among these factors. Research methods that may be used, tests that should be conducted, estimates of costs and potential benefits of suggested research should all be discussed.

BENEFITS:

1. Increased safety to the traveling public, realized through improved nighttime sign visibility.

2. A cost-effective material selection policy consistent with safety.

CLIENTS: Traffic Engineering and Safety, Highway Maintenance Division, and Materials Bureau

COST-EFFECTIVENESS OF CONSOLIDATING GOVERNMENT HIGHWAY SERVICES

I. PROBLEM STATEMENT

There are over sixteen hundred units of local government in New York State, ranging from New York City, with a population of over 7 million, to the village of Dering Harbor on Long Island whose population is 28. These jurisdictions are responsible for over 95,000 miles of highway. Every jurisdiction has a separate highway department, although the distribution of responsibility ranges from the over 6,000 miles maintained by New York City to the village of Cove Neck on Long Island that is only responsible for one-half centerline mile of highway. There are potentially significant economies that could be obtained through the consolidation of highway operations.

II. RESEARCH PROPOSED

A study is recommended to identify the areas where consolidation of services would be economically desirable. A set of guidelines should be established outlining functions that could be consolidated and potential associated cost savings.

The recommended study is different from other highway jurisdictional re-alignment studies carried out in the past, in that it will concentrate on the cost-efficiencies deriving from consolidated services. The government financial burden is proposed to be reduced through achievement of economies of scale, rather than transfer to another level of government.

Because the study will concentrate on consolidation issues, the research will focus on basic highway maintenance and operation functions and the requirements for providing these services. To the extent possible, the study will identify both functions that it is appropriate to consolidate, and methods of achieving this consolidation.

A key task will be to identify the institutional and political barriers which would adversely affect decisions based on economic factors and to suggest methods for dealing with such barriers. The study would also examine whether state-aid payments or other intergovernmental transfers could be structured to encourage consolidation.

III. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

A study of the type described would cost about $80,000 and will take about 12 months to produce. The identified research is expected to make recommendations for legislative changes.

IV. URGENCY AND PAYOFF POTENTIAL

State Law encourages the complete consolidation of overlapping local units of local government. However, there are potential benefits that would accrue just by consolidation of the highway services function. The direction of this is in the reduction and cost of governmental services by the elimination of duplication and waste.

11. NIGHTTIME VISIBILITY OF HIGHWAY SIGNS

Cost: $~~120,000~~ 40,000

Duration: 6 months

Products:

1. A synthesis of current knowledge on factors affecting nighttime visibility of highway signs and their relative importance.

2. An assessment of future research needs to ensure that the best combinations of relevant factors (such as brightness, contrast, letter size, etc.) are used in designing traffic signs.

3. A prioritized list of research projects on this topic including their scope, suggested research methods, and anticipated costs and benefits.

NIGHTTIME VISIBILITY OF HIGHWAY SIGNS

PROBLEM: Responding to increasing emphasis on needs of aging drivers in terms of vision and reaction time, brighter reflective sheeting for highway signs is being considered on the premise that " brighter is better". However, recent studies have shown that although older drivers need more illumination to see an object clearly, they also possibly suffer more from excessive glare associated with brighter sheeting.

Two measures of visibility for highway signs are detection distance and legibility distance. Detection occurs when a motorist sees the sign without being able to read it. Aside from driver's visual capabilities, sign detection is a function of its size, shape, brightness, placement, and complexity of the highway scene. Legibility occurs when a motorist can distinguish the letters, symbols, and words, thus reading the sign. Variables affecting legibility include color, size, and brightness; letter height, width, and spacing; and amount of contrast between background and legend.

Drivers require a minimum level of brightness both for detectability and legibility. Beyond this, one way of increasing detectability is using brighter materials. Limitations to this approach are the higher material cost and possible reduction in legibility due to overglow. A more effective approach may be using a combination of relevant factors such as brightness, contrast, size, and lettering to improve overall visibility of the sign. Questions that need to be answered are: To what extent and under what conditions does brighter reflective sheeting aid the driver? What combination of brightness, contrast, and other relevant factors best serve the motorist? What are the most effective design and material selection criteria for highway signs in terms of visibility, cost, service life, and replacement cycles?

OBJECTIVES:

1. To synthesize available and ongoing research on nighttime visibility of highway signs. Synthesis should focus on the relative importance of various factors for visibility, should summarize all results that have been obtained on this topic (through laboratory and field experiments), and identify significant gaps in the state of knowledge. It should also identify any potential applications of these findings to the material selection and design for highway signs in New York State.

2. To recommend and rank future research needs in determining relative importance of factors affecting the nighttime visibility of highway signs, and establishing trade-offs among these factors. Research methods that may be used, tests that should be conducted, estimates of costs and potential benefits of suggested research should all be discussed.

BENEFITS:

1. Increased safety to the traveling public, realized through improved nighttime sign visibility.

2. A cost-effective material selection policy consistent with safety.

CLIENTS: Traffic Engineering and Safety and Highway Maintenance Divisions and Materials Bureau

NIGHTTIME VISIBILITY OF HIGHWAY SIGNS

STAFF EVALUATION

I. REVIEW OF CURRENT LITERATURE

A. Available Literature

Transportation Research Information Service (TRIS) and Psychological Abstracts (PsycINFO) database searches revealed nearly 200 publications addressing various aspects of nighttime visibility of highway signs. Additional references may be found in such other disciplines as industrial engineering, human factors, ergonomics, and optometry.

FHWA recently completed a project titled Minimum Visibility Requirements for Traffic Control Devices. It was conducted to determine minimum distances at which traffic control devices should be visible to the driver, and determine the level of reflectivity (brightness) needed to satisfy these visibility requirements.

B. Ongoing/Programmed Research

Two FHWA-funded studies (one on evaluation of new reflective materials for use in highway construction, and the other on minimum luminance requirements for older drivers) are being pursued by North Carolina DOT. FHWA also has an ongoing cooperative research program addressing various aspects of reflectivity. Major issues addressed in this program are 1) implementation strategies for newly established in-service reflectivity requirements, 2) service life of highway signs,3) sign management systems,and 4) evaluation of reflectometers.

FHWA is about to launch a new study to evaluate the feasibility of implementing new reflectivity guidelines. NYSDOT is one of the agencies that volunteered to participate in this study. Each participating agency will survey a representative sample of their existing highway signs. Data collection is scheduled to begin shortly. The final report will include estimates of the number of signs to be replaced and the associated cost of replacement, to meet suggested minimum reflectivity guidelines.

C. Relevance

The research will review the available literature and monitor ongoing research activities to identify research needs and methods to achieve improved nighttime visibility. The data that will be collected by New York State on the condition of existing highway signs may be useful in identifying areas of improvement needed, and help rank future research needs.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACT

The suggested research will evaluate current information on relative importance of various factors for nighttime visibility of highway signs. It will assess gaps in information on this subject and recommend priorities for future research that will

1. Increase safety of the traveling public through improved nighttime visibility of highway signs.

2. Develop a cost-effective material selection policy, consistent with safety.

III. OVERVIEW OF PROJECT SCOPE

A. Approach

1. Review current information on factors affecting nighttime visibility and their relative importance, and summarize relevant results.

2. If methods for determining optimal combinations of these factors are identified, develop an implementation plan enabling use of these results by NYSDOT.

3. Identify significant gaps in knowledge of this topic. Recommend priorities for future research to ensure that best combinations of relevant factors are used in designing traffic signs.

4. Assess costs and benefits of recommended future research activities. Suggest models and testing methods to be used.

B. Resource Requirements

FY 94-95: $40,000

C. Estimated Duration

6 months

D. Implementation

Recommendations of this study will be evaluated by the Traffic Engineering and Safety Division, Highway Maintenance Division, and Materials Bureau. If future research recommendations are considered useful, they will be pursued at the state or national levels.

12. EVALUATION OF CONSTRUCTION QUALITY-ASSURANCE TECHNIQUES

Cost: $120,000

Duration: 18 Months

Products:

1. Survey of construction operations currently requiring long person-hours to evaluate (such as pile length and degree of compaction.)
2. List cost-effective, reliable methods for measuring quality of construction for those operations.
3. Evaluation of methods used by other state DOT's and contracting firms.
4. Specifications in DOT format for the identified test methods.

EVALUATION OF CONSTRUCTION QUALITY-ASSURANCE TECHNIQUES

PROBLEM: Costs of inspection for quality-assurance in construction projects are high to the Department because it requires presence of inspectors at almost every step of the construction process. Recently, a significant number of newly placed piles were found shorter than the lengths specified. Practical techniques need to be identified to verify and assure quality of construction, particularly for intermediate and hidden products such as pile foundations and compacted soils.

OBJECTIVES: Identify practical, reliable techniques that can be used to verify the quality of construction, especially for hard-to-measure parameters such as pile length and degree of soil compaction. This will reduce cost and increase reliability of construction inspection.

BENEFITS: 1) Reduced cost for quality-assurance by reducing person-hours needed.

2) Increased reliability of construction inspection.

CLIENTS: Construction, Structures Design and Construction, and Technical Services Divisions

EVALUATION OF CONSTRUCTION QUALITY-ASSURANCE TECHNIQUES

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Nondestructive Testing of Pavements and Backcalculation Moduli, edited by Bush and Baladi (1989) and published by ASTM, has several papers potentially related to the objectives of this research. Examples are:

- Reliability Testing of Seven Nondestructive Testing Devices.
- The Use of Falling Weight Deflectometer Data in Monitoring Flexible Pavement.
- Using NDT to Calculate the 1986 AASHTO Subgrade Effective Resilient Modulus.

Hossein, et al. (1992) suggested a technique for measuring pile length in a paper titled "Determination of Pile Length Under Existing Structures," presented during a DFI annual meeting in New Orleans. Other related research work can be found in FHWA Report DTFH 61-88-Z-00040 (Drilled Shafts for Bridge Foundations).

B. Ongoing/Programmed Research

1) NCHRP Project 21-5 (Determination of Unknown Subsurface Bridge Foundations) began in April 1992 with a target completion date of January 1995. Its objective of is to develop practical methods and equipments to determine characteristics of subsurface bridge foundations such as their type, depth and geometry (see project description attached.)

2) NCHRP Project 10-39 (Construction Testing and Inspection Levels) began in Jan. 1993 with a target completion date of Dec. 1993. The objective of this research is to develop administrative and technical guidelines for transportation agencies to use in establishing methods and optimal levels of inspection and testing for construction programs and projects (see project description attached.)

C. Relevance

Except for NCHRP Project 10-39, the listed nondestructive testing techniques are intended for existing structures, however, they may be directly applicable for quality- assurance during construction. NCHRP Project 10-39 is on its initial stages and it should be closely monitored in order not to duplicate the efforts.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACTS

With the identified techniques implemented in the Department, reduction of the person-hours needed for inspection may be significant because some construction operations will no longer require presence of inspectors at every step. Quality of inspection may also be improved.

III. OVERVIEW OF PROJECT SCOPE

A. Research Approach

Tasks:

1) Review current practice of the Construction Division to identify quality-assurance parameters that require long person hours to inspect, such as pile length and degree of soil compaction.

2) Review the literature to identify potential techniques.

3) Evaluate their reliability and cost-effectiveness based on application experience of other states, consultants, industries, etc.

4) Recommend these reliable and cost-effective techniques with their application areas identified.

5) Develop specifications for using the identified methods in DOT format.

6) Produce a final report summarizing the research and results.

B. Resource Requirements

FY 94-96: $120,000

C. Estimated Duration

18 months

D. Implementation

The research results will be evaluated, adopted, and implemented by the Construction Division, Structures Design and Construction Division, and Technical Services Division.

Project 10-39 FY '93
Construction Testing and Inspection Levels

Research Agency:	Bergstralh-Shaw-Newman, Inc.	Effective Date:	1/6/93
Principal Investigator:	Robert B. Newman, Verdi Adam, & Sanford P. LaHue	Original Completion Date:	12/5/93
Contract Amount:	$140,000	Revised Completion Date:	
		Estimated Completion Date:	

Percent complete through 06/30/93: **57**
Is project on schedule? **Yes**
Expenditures to date: **$95,200**
Are expenditures in keeping with project progress? **Yes**

Responsible NCHRP Staff Engineer
Crawford F. Jencks - 202/334-2379

PROJECT DESCRIPTION

Among a variety of responsibilities, transportation agencies must provide the general public with the best highway facilities possible, given available resources. Traditionally, agencies have engaged in extensive testing and inspection efforts to assure construction quality and, thereby, the satisfactory performance of the facility. Although serving the public well, such efforts consume an appreciable amount of resources. Throughout the country, limitations on staffing levels, combined with expanding construction programs, are forcing agencies to reexamine current levels of testing and inspection and the manner in which these quality assurance efforts are accomplished.

Although there have been successes, previous research on this subject often has been difficult to interpret and apply and has resulted only in incremental benefits in optimizing construction testing and inspection programs. Innovative techniques and methods must be investigated to assure continued quality in management of construction testing and inspection. Past and current research will be useful, but it is imperative that research now explore new and creative methods and produce results readily implementable by transportation agencies and the highway construction industry.

The objective of this research is to develop administrative and technical guidelines for transportation agencies to use in establishing methods and optimal levels of inspection and testing for construction programs and projects. Innovation is critical for the successful accomplishment of the research objective. As a minimum, the following tasks are required: (1) Conduct a comprehensive review of pertinent literature and current research from the highway industry and other related construction industries from both domestic and foreign sources. (2) Survey the construction industry to determine the methods, including the type and frequency of inspection and testing, for all commonly controlled parameters that are relevant to highway construction -- distinguish between method (prescription) and end-result approaches. In particular, seek to determine what quantifiable basis, if any, was used to establish current levels of inspection and testing for items critical to the quality and performance of the constructed facility while considering the importance of safety and economics. (3) Prepare a detailed work plan for the development of the administrative and technical guidelines. These guidelines must focus on methods having the greatest impact and may address such issues as: staffing requirements, types of specifications, and the methods and techniques for assuring quality. The work plan will be submitted to the NCHRP for review and approval prior to the conduct of subsequent tasks. (4) Implement the Task 3 work plan and develop the guidelines. Recommend demonstrations of selected portions of the guidelines with cooperating state highway agencies. (5) Prepare a final report including the guidelines and a plan for the recommended demonstrations. (6) Conduct the demonstrations and modify the guidelines if needed. (This task is optional, to be determined by the NCHRP.)

STATUS OF RESEARCH

At the present time, the NCHRP has only contracted for Tasks 1 through 3. The remaining tasks will be accomplished if Tasks 1 through 3 demonstrate promise.

Work is progressing well. A workshop is scheduled for July 27, 1993, to present and discuss some of the preliminary findings with state DOT construction engineers, contractors, and suppliers.

AMENDMENT(S) THIS REPORTING PERIOD: None

STAFF ASSESSMENT OF PROJECT SUCCESS

This agency was selected as having the best chance for success.

REPORT AVAILABILITY: None

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Arlington Heights, IL 60004

Project 21-5, FY '92
Determination of Unknown Subsurface Bridge Foundations

Research Agency:	Olson Engineering, Inc.	Effective Date:	4/27/92
Principal Investigator:	Larry D. Olson	Original Completion Date:	1/26/95
Contract Amount:	$350,000	Revised Completion Date:	
		Estimated Completion Date:	

Percent complete through 6/30/93: 26
Is project on schedule? Yes
Expenditures to date: $100,000
Are expenditures in keeping with project progress? Yes

Responsible NCHRP Staff Engineer
Scott A. Sabol — 202/334-3238

PROJECT DESCRIPTION

There are approximately 580,000 highway bridges in the National Bridge Inventory. For a large number of older non-federal-aid bridges, and to a lesser extent federal-aid bridges, there are no design or as-built bridge plans, and there is little or no information available to document the type, depth, geometry, or materials incorporated into the foundations.

The Federal Highway Administration now requires state transportation departments to screen and evaluate all bridges over rivers or streams to determine their susceptibility to scour; however, information on bridge foundations is necessary to perform such evaluations. Similar information on foundations is also needed for seismic evaluation of bridges.

Research is needed to develop practical methods and functional equipment to determine subsurface bridge foundation characteristics such as type, depth, geometry, and materials when little or no information is available. **The objective of this project is to evaluate, develop, and test concepts, methods, and equipment that will enable the determination of subsurface bridge foundation characteristics where this information is not available, is unknown, or is uncertain.**

Research will include the following tasks: (1) a review of existing, proposed, and conceptualized technologies having promise for use in determining unknown subsurface bridge foundation characteristics such as type, depth, geometry, and materials; (2) development of an analytical process for screening and evaluating concepts, methods, and equipment, considering the ability of the concept, method, or equipment to identify the foundation type, material, and geometry (including depth, size, and number of elements) under differing geologic, hydraulic, and hydrologic conditions; (3) evaluation of the identified concepts, methods, and equipment, considering advantages, limitations, developmental costs, initial and operating costs, and other important features and considerations; (4) submission of an interim report which includes a detailed research plan for evaluating and testing as many of the recommended concepts, methods, and equipment as are feasible under the remaining project budget. The detailed research plan may require the performance of mathematical or physical model studies, laboratory studies, and/or field evaluations; (5) evaluation of the concepts, methods, and equipment in accordance with the Task 4 research plan; (6) documentation of the results of the studies and evaluations and development of recommendations specifically noting the advantages and limitations of each along with estimates of the initial and operational costs for those methods and equipment that can be readily implemented in the field, and estimates of the cost and time necessary to fully develop and validate the recommended concepts, methods, or equipment which can not be readily implemented in the field at this time; and (7) submission of a final report.

STATUS OF RESEARCH

The research agency submitted a draft interim report on December 31, 1992, outlining the analytical process for screening technologies to be pursued, summarizing the lab tests to be performed, and defining the limited field testing program to be undertaken for evaluation purposes. A panel meeting with the research team was conducted in April 1993, and the research team was requested to revise the interim report based on the review comments of the panel. The revised interim report is expected in July 1993, at which time the project panel will ballot on its acceptability and how to proceed with the project.

AMENDMENT(S) THIS REPORTING PERIOD

There were no amendments during this period.

STAFF ASSESSMENT OF PROJECT SUCCESS

It is too early to estimate. The research team has signicant technical expertise in the subject area, yet the draft interim report requires substantial revision before the project panel will proceed with project activities. Some of the work for this project may be considered fundamental research in some respects, with some increased uncertainty for its outcome.

REPORT(S) AVAILABILITY: No reports are available.

PRINCIPAL INVESTIGATOR

Mr. Larry D. Olson
President
Olson Engineering, Inc.
14818 W. 6th Avenue, Unit 5A
Golden, CO 80401
303/278-3232

13. EVALUATING THE IMPACT OF CAAA REQUIREMENTS

This proposed research overlaps with a national study submitted to NCHRP by the Environmental Analysis Bureau. The Project is titled: "Qualification of Air Quality Benefits and Costs Resulting From Measures to Reduce Automobile Travel." The $1.5 million study is supported by New York, California, and Pennsylvania States and by TRB Committee on Transportation & Air Quality. Although project approval is still pending, it was recommended as a high priority research problem in the Transportation Research Circular No. 389, "Environmental Research Needs in Transportation." The difference between the two studies lies in the scope of implementation.

We have discussed the matter with Mr. A. Kupferman of the Policy Development Group (the initial suggestor of the national project). He questions whether initiation of this proposed project would be useful. Hence, in light of the proposed national study and given the large amount of funding required for studies of this nature, we concluded that conducting this project would be a duplication of effort and misallocation of valuable resources.

EVALUATING THE IMPACT OF CAAA REQUIREMENTS

I. PROBLEM STATEMENT

The CAAA requires the imposition of various Traffic Control Measures designed to help non-attainment areas achieve ambient air quality standards. In addition to the costs of implementing such measures, there is a significant cost to Federal, State and local agencies involved in the planning of such measures, in developing State Implementation Plans, in analysis to determine TIP conformity with SIP's, VMT forecasting to determine whether CAAA objectives are being met, and a variety of other direct and indirect costs which can be attributed to carrying out the provisions of the CAAA. In addition there is the cost to employers of 100 or more persons of implementing and monitoring mandated employee trip reduction plans. While the benefits of the CAAA required actions are observed and reported, the total cost of achieving these results is not known.

II. RESEARCH PROPOSED

1. For New York City identify the various direct and indirect costs incurred by public and private agencies which are attributable to implementation of CAAA required traffic control measures and the other administrative and technical cost incurred in implementing CAAA regulations.

2. Estimate the annual costs of each identified activity and aggregate to estimate regional totals.

III. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Total cost of the effort is estimated at $75,000 with a six-month time schedule.

IV. URGENCY AND POTENTIAL PAYOFF

Accurate estimates of compliance costs will allow public and private agencies to prepare more accurate budget and planning estimates.

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: R. J. Perry, Eng. Research/Development Bur., 7A-600

FROM: A. Kupferman, Policy Development Group, 5-309

SUBJECT: CONTRACT RESEARCH PROJECTS

DATE: October 20, 1993

Attached is a Stage 2 submission to NCHRP for a $1 million study to Quantify Air Quality Benefits and Costs Resulting from Measures to Reduce Automobile Travel.

This is slightly different than the study discussed at our recent meeting. In light of this proposed study, (supported by New York, Pennsylvania and California), does it make sense for NYSDOT to fund the fifth study on your list:

> "5. Evaluating the Impact of CAAA Requirements on Travel Trends and Air Quality Improvements in Urban Areas"?

AK:rpw
Attachment
cc: L. P. Rossi, Planning Division, 4-115
File: Contract Research Projects
Disk: Perry.AK

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
FY 1995 STAGE 2 SUBMISSION

I. PROBLEM NUMBER

95-A-1/A-4/A-5

II. PROBLEM TITLE

Quantification of Air Quality Benefits and Costs Resulting from Measures to Reduce Automobile Travel

III. RESEARCH PROBLEM STATEMENT

The Clean Air Act Amendments identifies sixteen transportation control measures (TCMs) that are expected to provide emission reduction benefits. These measures are intended to reduce mobile source air pollution. The majority of the measures aim to reduce vehicle usage and automobile travel. The Intermodal Surface Transportation Efficiency Act (ISTEA) further reinforces the use of these measures by providing the means to shift Federal-aid normally available for preserving and improving highways and bridges to projects implementing identified TCMs.

States and Metropolitan Planning Organizations (MPOs) are under increasing pressure to invest in TCMs in non-attainment areas. Yet they lack information on the benefits, costs and expected air quality improvements of the various TCMs to help them select those most effective in meeting their needs. Although USEPA did provide a guidance document on this subject, its information was general and qualitative. States and MPOs require more specific and quantitative information. In addition, much of the air quality information related to TCMs is emission-based. Very little speaks to expected impacts on air pollutant concentrations. This type of knowledge is needed to convince often reluctant public officials and the public that these type of measures are necessary and will realize an air quality benefit.

The proposed research would result in an evaluation of TCMs for their air quality improvement effects, their costs and benefits and their impacts on other environmental and socio-economic factors.

IV. RESEARCH PROPOSED

The objectives of the research are: to ascertain the air quality effects and costs and benefits of TCMs and related transportation demand management (TDM) measures in a quantitative and comprehensive manner; to ascertain if implementation of a TCM can result in a measurable change in air quality levels; and to ascertain in a quantitative and comprehensive manner multiple effects such as congestion mitigation, energy conservation, greenhouse gas emission effects, preservation of open space, etc. of TCMs and/or TDM measures.

It is recognized that several ongoing research studies are being conducted in transportation air quality issues. These include two NCHRP studies, one on intersection air quality modeling and the other on improving transportation data for the estimation of mobile source emissions. Also TCRP has at least two studies ongoing in this general area. They are on policy options to attract auto users to public transportation and on cost effectiveness of TDM measures. In addition, a number of studies have been proposed including the impacts of HOV improvements on air quality and the effects of transit on air quality. The proposed research should not duplicate ongoing or approved research but build upon information gained from those efforts to more thoroughly and comprehensively perform the proposed research.

Employee trip reduction and traffic flow improvement programs are, at a minimum, of specific interest for this research.

The research will be done through the following tasks:

Implementation search - A search will be conducted across the nation for TCM or TDM measures with an identified goal of improving air quality or which can reasonably be expected to have an air quality effect that have been implemented or are about to be implemented. This information will be stratified by type of measure, the estimated air quality effect, the methodology used to derive the estimated air quality effect, among others. In those cases where no air quality effect was estimated,the research will estimate the air quality effect using a reasonable methodology, depending on the measure under consideration and its expected air quality result.

Monitoring search - For those areas that have implemented TCM or TDM measure(s), the research will establish which existing monitoring stations and data are available to examine the impact of the implementation of these measures on measured air quality levels. The appropriate scale of the monitoring data (i.e., microscale, neighborhood, regional) should be considered in the evaluation of the measure. Using appropriate statistical and/or other analytical techniques, the research will attempt to demonstrate an air quality effect of the measure(s) implementation. Care should be taken to account for external effects such as vehicle turnover, inspection/maintenance implementation, fuel effects, etc. that may mask the effect of the TCM or TDM measure(s). A measure of the air quality effects realized per dollar expended for each of the measures evaluated should be presented.

Monitoring - From among the identified measure(s) about to be implemented (from the implementation search above), one or two shall be selected for monitoring to attempt to establish a clear cause and effect result of a measure's implementation upon air quality. The monitoring will begin prior to the implementation of the measure(s) and continue after its implementation until a sufficient database is established that will allow for a reasonable

air quality evaluation of the measure(s). The monitors shall be optimally sited to capture the maximum effect of the measure's implementation. The optimal siting locations can be determined through modeling analyses or other appropriate techniques.

Multiple effects - The research will incorporate an analysis of multiple effects (both direct and indirect) of the implementation of the measures that were identified in the implementation search. This assessment should be as quantitative as possible, realizing that some of the effects may be difficult to quantify. The assessment of the multiple effects should consider the context of the measures adoption. This should include the necessary infrastructure, both physical and social, to support the measures. Finally the assessment should consider the various effects individually, as well as collectively, to balance them with air quality effects.

Report- The research will result in two reports. In order to make the results of this research as useful as possible to States and MPOs, the outcome of the implementation search, monitoring search, and the multiple effects analyses shall be presented in a report upon completion of that research. In this way this information can be disseminated as quickly as possible for the States and MPOs to consider in their TCM selection process. The results of the monitoring effort will be presented in a subsequent report.

V. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

The estimated funding for this project is $1,500,000. Of this amount, roughly $1,000,000 is estimated for the monitoring effort and $500,000 for the remaining tasks. The research will require approximately 30 months to complete.

VI. URGENCY AND PAYOFF POTENTIAL

The Clean Air Act Amendments of 1990 and ISTEA place great emphasis on the use of TCMs to provide sizable contributions toward attainment of air quality standards in non-attainment areas. It is necessary to determine which measures are most effective in providing air quality benefits and to determine what a reasonable air quality benefit may be expected from the implementation of one or more of these measures. It is also important to know what other effects may result from these measures. As States and MPOs struggle with TCMs, this information is critical to allow them to select the measures appropriately and invest their transportation funding wisely. Thus, the urgency for this research is very great. The payoff from this research is also very great. With successful completion of this research, those measures that are most cost effective and have the best air quality potential will be identified and will likely be implemented by the States and MPOs.

VII. PERSONS DEVELOPING THE PROBLEM

This problem statement was developed jointly and is recommended by

the New York, California and Pennsylvania Departments of Transportation. The persons developing the problem statement are:

John Zamurs, New York State DOT
Paul Benson, CALTRANS
James Byers, Pennsylvania DOT

This proposal is supported by the TRB Committee on Transportation and Air Quality and was recommended as a high priority research problem in the Transportation Research Circular No. 389, Environmental Research Needs in Transportation. This proposal is similar to and stems from a research proposal from the AASHTO Standing Committee on the Environment entitled "Effectiveness and Acceptability of Transportation Control Measures".

VIII. PROBLEM MONITOR

John Zamurs, Ph.D.
Head, Air Quality Section
Environmental Analysis Bureau
New York State Department of Transportation
5-303
State Office Campus
Albany, NY 12232

IX. DATE AND SUBMITTED BY

Robert J. Perry, Ph.D.
Director, Engineering Research & Development Bureau
New York State Department of Transportation
7A-600
State Office Campus
Albany, NY 12232

14. DEPARTMENT'S INTEGRATION OF ISTEA MANAGEMENT SYSTEMS

An Executive Steering Committee was recently established for development/management/coordination of the management systems and a preliminary Concept Plan has been developed. Since this problem is being addressed internally, we have not developed project scope, cost, and duration estimates for contract research consideration.

DEPARTMENT'S INTEGRATION OF ISTEA MANAGEMENT SYSTEMS

PROBLEM:

On December 18, 1991, Congress enacted the Intermodal Surface Transportation Efficiency Act (ISTEA). This act is the primary source of federal funds for surface transportation projects. A requirement of this legislation is to have each state develop and implement the following management systems.

Pavement Management System, Bridge Management System, Highway Safety Management System, Traffic Congestion/Mobility Management System, Public Transportation Facilities and Equipment Management System, Intermodal Transportation Facilities and Systems Management Systems, and Traffic Monitoring System.

The primary purpose of these management systems is to improve the efficiency of, and protect the investment in the nation's existing and future infrastructure. Additionally, these management systems must enhance metropolitan and statewide planning and programming.

States must implement each system beginning in federal fiscal year 1995, and must annually certify before January 1 of each fiscal year, that the systems are being implemented, or the federal government may withhold up to 10% of funds apportioned under Title 23, U.S.C. and the Federal Transit Act.

There are, however, numerous fundamental issues yet to be resolved. For instance, what would be the most efficient structure for those systems? What mechanism can be utilized for cost management? How can coordination within the systems be realized to ensure consistency of output and avoid conflicting strategies? How can we effectively integrate the systems into the Department's overall operations? and How can the state take maximum advantage of the systems?

Theoretically, those management systems would provide timely and valuable information needed to develop priorities and make investment decisions, which could greatly enhance operations and maximize productivity. However, the practical implementation of those systems can be quite costly, confusing and highly bureaucratic, unless an effective plan for deployment is developed. This plan should focus on coordination within the interrelated elements of the systems and their integration into the transportation planning and operation process.

OBJECTIVES:

1. Development of a work plan for the Management Systems.

2. Coordination within all Management Systems.

3. Integration of Management Systems into the transportation planning and operation process.

BENEFITS:

1. Avoid confusion or misinterpretation of federal rule making.

2. Provide a blueprint to help DOT meet minimum federal requirements.

3. Achieve coordination within all management systems.

4. Integrate the Management Systems into other products of ISTEA 1991 e.g. Long-range Plans, Transportation Improvement Programs (TIPs) and State Implementation Plans (SIPs), and into the overall planning and operation process.

CLIENT:

Planning and Program Management Group.

DEPARTMENT'S INTEGRATION OF ISTEA MANAGEMENT SYSTEMS

STAFF EVALUATION

I. REVIEW OF CURRENT TECHNOLOGY

A. Available Literature

Since the enactment of ISTEA legislation on December 18, 1991, national, state, local and regional transportation agencies have been striving to provide interpretations, outline implications and identify expectations. A coordinating Unit has been established within NYSDOT for integrating the different elements of the management systems. The Unit has recently developed a preliminary Concept Plan.

A literature search revealed that several reports and conference proceedings on ISTEA Management Systems have been published. A national conference on integrating transportation Management Systems into Transportation Planning and Operation is scheduled to be held from November 7 through November 9, 1993 in Nashville, Tennessee.

B. Ongoing Programmed Research

A literature search has shown that the Pennsylvania Department of Transportation (PENDOT) has initiated a similar study titled "ISTEA Management Systems Business Plan." The project is still in progress. PENDOT study, however, unlike this proposed study, does not emphasize the issue of coordination within the seven Management Systems and their integration into the transportation planning process.

C. Relevance

The relevant literature may be used as guidelines for the proposed study. The research should coordinate and communicate with what has already been accomplished by NYSDOT staff as well as other states.

II. ASSESSMENT OF ANTICIPATED BENEFITS/IMPACTS

The client (Planning & Program Management Group) has been contacted to assess the need for the study. It was determined that an Executive Steering Committee was recently established for development/ management/coordination of the Management Systems. The Committee, which consists of six executive managers has developed a Draft Concept Plan which include resource needs, schedule, and responsibilities for developing and integrating Department Management Systems. Thus, the initiation of the study would be an unnecessary duplication of ongoing Department effort.

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